

## **FOODS THAT MANAGE GASTROINTESTINAL DISORDERS**

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### **Abstract**

*Gastrointestinal disorders are the most widespread problems in health care. The gastrointestinal tract is the largest lymphoid organ in the body, so it is not surprising that intestinal diseases are common among immune-deficient patients. Further, pathogens do influence the gut function. On the other hand, dietary habits and specific food types can play a significant role in the onset, treatment, and prevention of many GI disorders. Similarly, certain food constituents or as such foods themselves serve as remedy for various GI disorders. Such foods are termed as functional foods and the present review article emphasizes on various functional foods that render remedial benefits to the population who suffer from such GI disorders.*

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### **INTRODUCTION**

Food is an integral part of the daily life but we spend less time choosing, preparing and eating food <sup>(1)</sup>. Consequently many of us are not eating properly which may result to major G.I dysfunctions or as a note of warning was sounded “abuse your stomach and be sick, control your stomach (what you eat) and be well” <sup>(2, 3)</sup>. Practicing good dietary habit requires a little more time and planning than we can afford in this fast changing world. However, its benefits will pay off at the long run because of the sufficient scientific evidence that link most G.I disorders to diets\dietary habits <sup>(4)</sup>. Despite the above findings, some diets also have beneficial effects on the G.I tract <sup>(5, 6)</sup>.

Digestive disorders are among the most common problems in health care. About 30% to 40% of adults claim to have frequent indigestion, and over 50 million visits are made annually to ambulatory care facilities for symptoms related to the digestive system. Over 10 million endoscopies and surgical

procedures involving the gastrointestinal (GI) tract are performed each year <sup>(7)</sup>. Dietary habits and specific food types can play a significant role in the onset, treatment, and prevention of many GI disorders. In many cases diet can also play a role in improving patients' sense of well-being and quality of life by decreasing pain, suffering, worry health care visits, and the costs associated with GI diseases. This review aims at exploring the management of gastrointestinal disorders by using functional foods.

### **GASTROESOPHAGEAL REFLUX DISORDER (GERD)**

The Brazilian consensus conference considered GERD to be “a chronic disorder related to the retrograde flow of gastro-duodenal contents into the oesophagus and/or adjacent organs, resulting in a spectrum of symptoms, with or without tissue damage”. <sup>(8)</sup>. A study conducted by Emerenziani and Sifrim in 2005, about 10 – 40 per cent of GERD patients demonstrated gastric emptying especially after the intake of heavy fatty meals and it was noted that heartburn and regurgitation were common.

Nutritional guidelines for prevention of gastroesophageal reflux and esophagitis includes restriction of fatty meals, soon after the intake of meals, vigorous physical activity should be avoided; consumption of fiber has to be modified, if inflammation exists, it is better to avoid highly spiced foods<sup>(9,10)</sup>. With regard to the gastroesophageal reflux disease low carbohydrate diet, there have been no large scale trials, however a case series and small two trials have provided evidence that low carbohydrate diets may ease symptoms of GERD. In the first small case series, five individuals were administered with standard Atkins diet, which restricts carbohydrates to 20 grams daily, while allowing unlimited access to protein and fat. Atkins diet according to patients self-reports, all the five patients had a remission of GERD symptoms within one day to two weeks from the time they commenced diet, and symptoms reoccurred when it was discontinued.<sup>(11)</sup>

Chewing non-mint gum increases saliva production and thereby decreases acid erosion in oesophagus. Consumption of banana, low fat yogurt, skim milk, apple juice, whole grain cereals are suggested for this condition<sup>(12)</sup>. As per Kaltenbach et al in 2006, avoidance of chocolate, citrus fruits, alcohol, tobacco is typically recommended for GERD treatment. A review of the literature included 2,039 studies on lifestyle factors, comprising weight loss, timing of meals, elevation of head during sleep, and avoidance of citrus, chocolate, alcohol, smoking and coffee. Of the 100 relevant studies from this analysis, no evidence was found for the efficacy of dietary measures or smoking or alcohol cessation in improving symptomology, LES pressure, or oesophageal pH profiles. The only effective factors were elevation of the head of the bed and lifestyle changes that led to

weight loss (mean loss of 12.4 kg in 13 weeks).<sup>(13)</sup>

## **PEPTIC ULCER**

Peptic ulcers are small sores that form in the lining of the oesophagus, stomach, or duodenum<sup>(14)</sup>. Almost 85% of ulcers are present in duodenum and 15% in stomach. An estimation of 70% gastric ulcer and 92% duodenal ulcer are implicated by *Helicobacter pylori* infection<sup>(15)</sup>. Ryan-Harshman & Aldoori, 2004 documented from their study that diet rich in high fiber, particularly soluble fibre may reduce the risk of duodenal ulcer and other factors like alcohol and caffeine has little effect on risk of ulcer<sup>(16)</sup>. Similarly Bananas are well known for their antacid effects that protect the stomach from ulcers and ulcer damage. Increased consumption of omega 3 and omega 6 fatty acids than the usual intake is suggested as it is having a protective effect. Foods containing flavonoids especially apples, cranberries, onion, garlic; tea inhibits growth of *Helicobacter pylori*. In some people spicy foods worsen the condition<sup>(17)</sup>. Leucocyanidin a flavonoid present in banana increases the thickness of mucosal membrane of stomach layer<sup>(18)</sup>. Larkworthy et al 1975, Khayyal et al 2001, Glycyrrhiza glabra (Licorice) root has been historically used as an anti-inflammatory, demulcent for treating gastric and duodenal ulcer. Studies prove that the consumption of deglycyrrhizinated licorice (DGL) may enhance mucous secretion thus accelerates healing of ulcers. Clinically alternative health care providers prescribe additional demulcent herbs like Aloe Vera, *Ulmus fulva* for healing and soothing properties<sup>(19)</sup>.

## **CELIAC DISEASE**

Celiac disease is a digestive malabsorption disease usually associated with allergic response to foods containing gluten

found in grains particularly in barley, rye and wheat. Hence, Celiac disease is also known as permanent gluten sensitive enteropathy. The onset of celiac disease starts from infancy to young adulthood<sup>(20)</sup>. Consumption of corn, tapioca, rice, soya bean, arrowroot, administration of omega 3 fatty acids, supplementation with calcium and vitamin D were considered in nutritional management of celiac disease. A study conducted by Kemppainen et al in 1995, Kinsey et al 2008, Bode et al 1996, Kemppainen et al 1997 demonstrated that 20 – 38 % of celiac patients have some nutritional deficiencies<sup>(21-24)</sup>. Common nutrient deficiencies in celiac subjects at diagnosis and after gluten free diet can be calorie, protein, fibre, iron, calcium, magnesium, vitamin D, Zinc, folate, Niacin, Vitamin B 12, Riboflavin. Lohiniemi et al 1998, conducted an investigation by rising a question oats can be consumed or not. The emergence of this statement can be due to the misconception among individuals, that avenin (a storage protein) was toxic to celiac patients. Moreover, the use of oats in gluten free diet is still debated.<sup>(25)</sup> Recent studies revealed that consumption of oats in moderation, oat free from cross contamination with gluten containing grains is well tolerated in both children and adults in long term<sup>(26-30)</sup>. Similarly Case et al, 2003 et al, in their study proved that milk, yogurt, white and brown rice, corn flour, spaghetti, cakes, cookies<sup>(31)</sup> built up a gluten free diet. Robert Predit in health daily news (2013) reported that management of celiac disease entails ensuring of all vitamins and other nutrients required for the body along with the elimination of gluten. He in his study concluded that fruits, vegetables, lean meat, poultry, fish, egg, legumes, beans etc. are naturally gluten free foods.<sup>(32)</sup>

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## **INFLAMMATORY BOWEL DISORDER**

Inflammatory bowel disorder is a chronic inflammatory intestinal disorder of unknown cause. Graham et al in 2002 and Han et al in 1999 found out an estimation of 85% of hospitalized patients with IBD have protein energy malnutrition based on the assessment of anthropometric and biochemical parameters.<sup>(33,34)</sup> Chron's disease and ulcerative colitis are the two major forms of inflammatory bowel diseases. Ahmad et al in 2001 mentioned that the onset of the condition is around 15 to 30 years and comparatively less number of people had onset at adulthood<sup>(35)</sup>. A major difference between ulcerative colitis and Chron's disease is that, it can occur in any part of the gastrointestinal tract (mouth till anus),<sup>(36)</sup> whereas ulcerative colitis extends from rectum to colon.<sup>(37)</sup> Diet and nutrients play an important role in bringing remission to IBD. Messori et al in 1996 found that enteral nutrition is more preferred means of nutritional support.<sup>(38)</sup> Patients with IBD should follow a normal, healthy diet as tolerated. Carol Rees in 2003 mentioned in her study that a low fiber diet is suggested for IBD patients. Fiber containing foods are added slowly with the introduction of water soluble fibers like oatmeal, banana, rice, apple sauce and then it is followed by insoluble fibers wheat, bran, corn as tolerated<sup>(39)</sup>. Prebiotics and probiotics are beneficial in certain conditions including IBD.<sup>(40)</sup> Onion, garlic, banana are food sources of prebiotics. Other than this inulin and FOS are available as enteral feeds in market. The most widely used probiotics includes *Lactobacillus* and *Bifidobacterium*. Use of probiotics has an effect to decrease the frequency and duration of antibiotic associated diarrhoea, travellers' diarrhoea.<sup>(41)</sup> Fermented milk, yogurt with live cultures are also beneficial.<sup>(42)</sup>

## **CONSTIPATION**

The term constipation refers to difficulty in defecation, and infrequent bowel movements during an extended period of time. This is because as the age increases physical activity varies. Common cause of constipation includes improper dietary habits, sedentary life style, lowered intestinal motility, etc. Constipation is categorized into normal transit constipation<sup>(43)</sup> obstructed constipation, slow transit constipation. Ashraf et al in 1996 mentioned that, in normal transit constipation the stool transverse at normal rate through the colon and stool frequency is also normal, but the patient believes they are constipated. Obstructed constipation which is also known as pelvic floor dyssynergia is commonly due to dysfunction of pelvic floor or anal sphincter.<sup>(44)</sup> Preston et al in 1986 stated that slow transit constipation occurs commonly in young women who have infrequent bowel movements.<sup>(45)</sup> In order to prevent constipation adults should follow a diet which includes 6-11 servings of grains and cereals and 5 – 9 servings of fruits and vegetables daily.<sup>(46)</sup> Fiber is a major food component helps to prevent constipation. It forms bulk in small intestine and are digested in large intestine by bacteria. Fruits, vegetables, whole grains, nuts etc. are foods rich in fibre. Recommended dietary allowance of 20 to 35g of dietary fibre is suggested by ICMR, but most people do not even consume 10-15 g of fiber daily. Another aspect of nutrition that can promote constipation is lack of fluids and vitamin B complex in the diet.

Fluids may be given as drinking water or any beverages such as soups, juices, milk beverages etc. through diet. Similarly, whole grains despite providing more fibre also a good source of B complex vitamins. Apart from these food stuffs, formulated foods with yeast and meat products like liver are good source of B vitamins.

## **IRRITABLE BOWEL SYNDROME**

IBS is a common syndrome involving altered intestinal motility, increased sensitivity of gastrointestinal tract, bloating etc. Magdy et al in 2015 mentioned in her study that IBS are more common in females than males. Excess use of laxatives, antibiotics, caffeine, gastrointestinal illness, lack of sleep, rest, fluid intake etc. are other contributing factors of IBS.<sup>(56)</sup> Although, it is symptomatic yet it would take at least 12 months to rule out IBS. Dorssan in 1997 stated that diet, education, medication, counselling plays an important role in management of the condition.<sup>(57)</sup> El – Salhy et al, 2012 found out that IBS patients consume a diet poor in Fermentable Oligosaccharides, Disaccharides, Monosaccharides, and Polyols (FODMAPs) and insoluble fibre. Asparagus, broccoli, cabbage, onion, peas, wheat, rye, watermelon, milk of cow, sheep and goat, yogurt, cottage cheese, ice cream, apple, mango, pear, peaches, honey, cherries, plums, avocado, mushroom, cauliflower etc. are the foods rich in FODMAPs. Carrot, celery, eggplant, lettuce, green beans, tomato, lactose free and rice milk, lactose free yogurt, banana, blueberry, grapefruit, orange, strawberry, maple syrup, lemon, lime raspberry, glucose etc. are the foods low in FODMAPs.<sup>(58)</sup> Consumption of probiotics increases the tolerance of FODMAP rich food stuffs and regular exercise amplifies the beneficial effect. Probiotics are beneficial to IBS but the magnitude of effectiveness depends on the species. (P Moayyedi et al, 2008) Excess of dietary fat, caffeine, sugar such as lactose, fructose, sorbitol are well tolerated than in normal person.

A recent review and meta-analysis of treatments available for IBS concluded that

soluble fiber supplementation, such as ispaghula, was likely to be beneficial in alleviating common IBS symptoms and constipation, in particular, but that insoluble fibers, such as bran, did not replicate these benefits compared with a placebo, albeit the latter did not cause symptom exacerbation either<sup>(59)</sup>. The evidence is not definitive, however, and further studies are needed to demonstrate convincing results<sup>(60)</sup>. Two issues need to be stressed in relation to fiber: its nature (ie, soluble or insoluble) and the manner in which it is prescribed. Although sudden increases in fiber intake could well provoke symptoms, whereas much more gradual increments may be better tolerated, these assumptions have not been formally tested.

## **SHORT BOWEL SYNDROME**

Prasad et al in 2011 defined SBS as a condition of excessive resection of intestinal tract frequently which results in inadequate digestion, malabsorption of nutrients. It occurs in 15 % of adult patients who undergo intestinal resection.<sup>(61)</sup> Similarly a study conducted by Carol Rees in 2005, found that 70-75 % loss of small bowel leads to short bowel syndrome.<sup>(62)</sup> The condition can occur at any age group; however the cause will vary somewhat in children and adult. The causes of SBS in children include abdominal tumor, radiation enteritis, trauma, congenital short bowel syndrome etc. and in adults the causes include Crohn's disease, trauma, massive surgical resection etc. Food and diet plays an important role in the management of SBS. Also food choices vary depending upon the site of resection. Some good choices of food for the condition are Brown rice or white rice, pasta, sliced bread, macaroni, noodles, oatmeal, puffed rice, potato, sweet potato, yam, plantain, bananas, poultry, shellfish, plain, yogurt,

buttermilk, oral rehydration solution, soup broth. Fermentable oligo – di – and monosaccharides and polyols must be only two to three small portions per week initially. Apples, pear, onion, melon, beans are those under FODMAPs category.<sup>(63)</sup>

Frequent oral feedings in the form of six small solid meals per day is suggested for the condition at the adaptation phase.<sup>(63,64)</sup> Whereas in patients with inadequate absorption during day time, a nasogastric tube used at bed time and infused with liquid supplement of 1000 Kcal overnight.<sup>(65,66)</sup> Soluble fibers (pectin, guar gum) that are fermented in the colon to produce SCFAs may be of benefit because they delay gastric emptying by increasing intra gastric viscosity.<sup>(67)</sup> In SBS, pectin serves as a precursor for SCFAs; SCFAs increase oxygen uptake in the colon, therefore maintaining gut integrity. Mucosal growth is stimulated by early refeeding (free fatty acids, sugars, and proteins)<sup>(68)</sup>. Most fruits and vegetables provided are not used efficiently in patients with SBS because they provide few calories.<sup>(69)</sup> In contrast, foods with small amounts of finely divided fiber (e.g., potatoes, bread, and tomato juice) may serve as substrates for colonic epithelial cells. Small amounts of fiber are likely to absorb small amounts of water, and small quantities of some fibers may be saved in the colon with other carbohydrates. If the patient is able to maintain nutritional stability with oral foods, small amounts of fibrous foods may add to the variety of foods in the diet.<sup>(70)</sup>

## **CONCLUSION**

Gastrointestinal disorders are the most symptomatic and exhaustive in nature. The diet, dietary habits and hygiene explicitly play an integral role in the aetiology of gastrointestinal disorders. Overall, a judicious diet incorporating whole grains, fresh organic fruits and vegetables contributing to high levels of antioxidants and FODMAPs have been

convincingly associated in the management of these disorders. High intake of functional foods coupled with probiotics, omega – 3 fatty acids and devoid of lactose are the mainstay therapy for all diet induced gastrointestinal disorders. In this connection, nutritionists / dieticians should be actively involved in the design and execution of prudent dietary advice for these GI disorders. This has to go a long way since nutritionists / dieticians role is not only advising diet for the management of the GI disorders but rationally it's their responsibility to take care of the actual nutritional requirements too.

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